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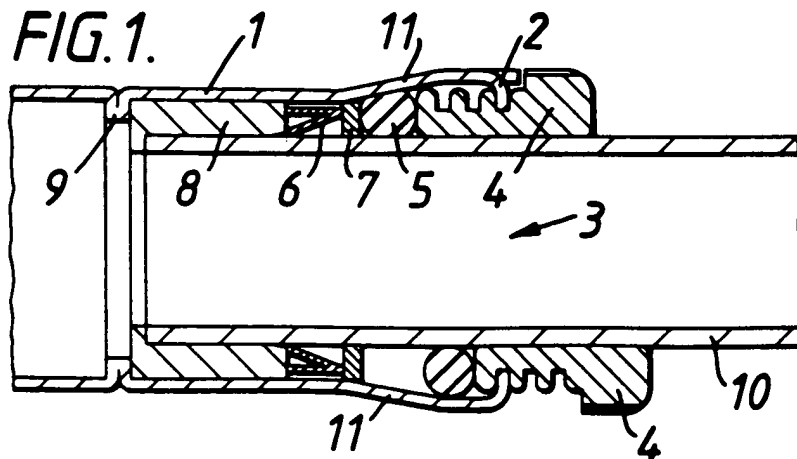
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(54) Improvements relating to pipe couplings and pipe joints formed therewith

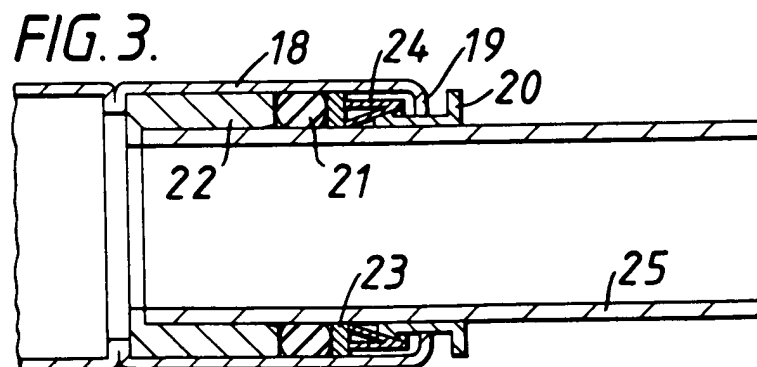
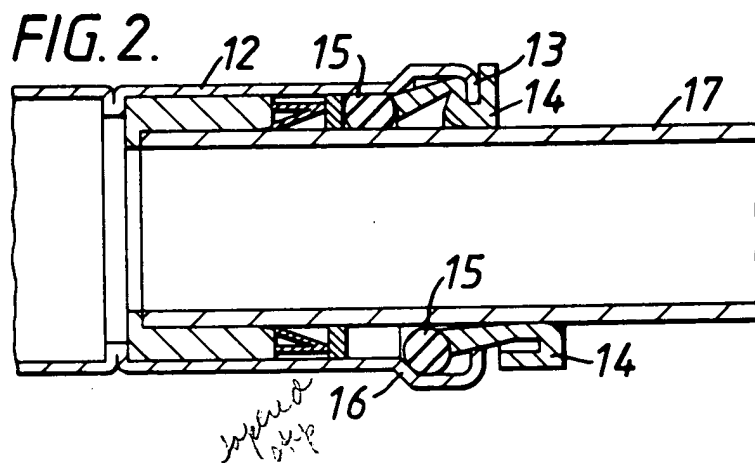
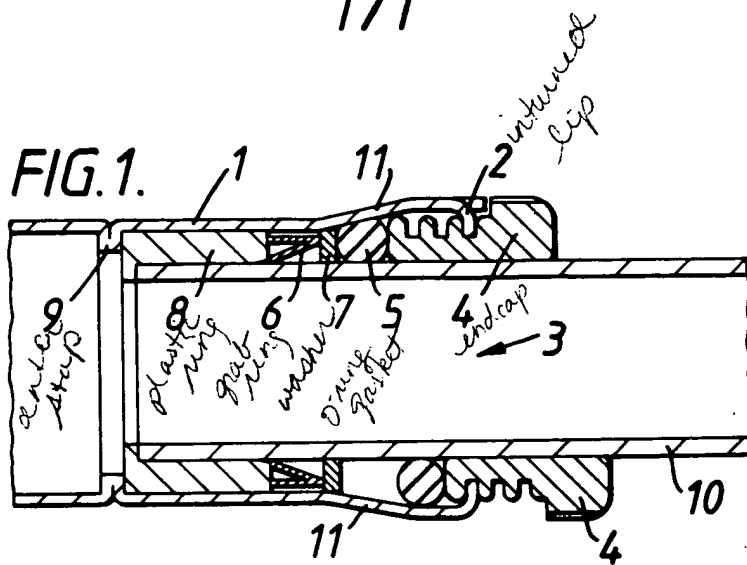
(57) The invention provides a pipe coupling comprising a sleeve having at least one open end for the receipt of a pipe to be coupled; an annular grab ring located within the sleeve, the grab ring having teeth which in an unstressed condition extend and project radially inwardly within the sleeve member and are inclined axially inwardly of the sleeve member; an elastomeric annular sealing gasket located within the sleeve member on the side of the grab ring facing the open end; and an annular end insert member capable of insertion through the open-end of the sleeve so as to provide an axially compressive force upon the annular gasket located therewithin.

In couplings with the order of the grab ring and gasket reversed the annular insert member can be used to radially expand the grab ring allowing the joint to be assembled and disassembled.



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SPECIFICATION

Improvements relating to pipe couplings and pipe joints formed therewith

5 This invention relates to pipe couplings and pipe joints formed therewith. More particularly, the invention relates to such couplings and joints for connecting pipes of plastics or soft metal.

10 It is to be understood that by the word "Pipe" as used herein is included any pipe-like member such as pipe, tube and hose, and hollow pipe fittings used in pipework such as elbows, "T" junctions, end members and valves for example. Similarly, the expression "pipe couplings" includes hollow pipe fittings such as elbows and "T" junctions when adapted to serve as couplings.

20 It is also to be understood that by the expression "soft metal" as used herein is meant that class of easily workable metals and metal alloys of which copper is a prime and typical example.

25 Couplings for such pipes have previously been proposed comprising a sleeve adapted to encircle the two ends of juxtaposed pipes to be connected, the sleeve containing metal annular grab rings having radially and axially inwardly extending teeth arranged to bite into the external periphery of the pipe to be coupled and inhibit removal once inserted into the sleeve-like member, annular sealing gaskets for providing a seal against the pipes to be connected, and frequently a washer separating the grab-ring from the sealing ring.

35 Although such arrangements are generally satisfactory in operation, a problem that does occur is that because of the necessary radially inward compression of the sealing gasket and projection of the grab ring which ensures satisfactory performance of the coupling, assembly and disassembly of the coupling is difficult.

45 It is an object of the present invention to overcome or at least substantially reduce this problem.

50 According to the invention there is provided a pipe coupling comprising a sleeve having at least one open end for the receipt of a pipe to be coupled, annular interior insert members located within the sleeve, said insert members comprising a grab ring and a sealing gasket; and an end insert member capable of location about a pipe when disposed in the coupling said end insert being capable of axial movement at least partially within the open end of the coupling when located about a pipe whereby to cause radial movement of at least one interior insert member to ease axial movement of the pipe relative to the coupling.

60 A particular problem with this kind of coupling is that in order to ensure an adequate seal, the gasket ring must be compressed when the pipe is inserted into the coupling.

This causes difficulty in insertion and similarly increases the difficulty of dismantling the coupling should this be so desired.

70 This problem is overcome or at least substantially reduced in one embodiment of the invention in which there is provided a sleeve having at least one open end for the receipt of a pipe to be coupled; an annular grab ring located within the sleeve, the grab ring having teeth which in an unstressed condition extend and project radially inwardly within the sleeve member and are inclined axially inwardly of the sleeve member; an elastomeric annular sealing gasket located within the sleeve member on the side of the grab ring facing the open end; and an annular end insert member capable of insertion through the open-end of the pipe so as to provide an axially compressive force upon the annular gasket located therewithin.

85 With such an arrangement the coupling is fitted around the pipe to be connected, and the end insert member then inserted into the open-end of the coupling about the pipe so as to compress the sealing gasket and provide the necessary seal with the pipe.

90 The end insert member may be removable so that the compression upon the sealing gasket can be relaxed so as to aid dismantling of the joint formed with the pipe by reducing the force necessary to remove the pipe from the coupling.

95 The coupling is preferably double ended and has the same provision of grab ring and sealing gasket at both ends. An end stop may be located generally centrally of such a coupling to locate the ends of pipes inserted therein.

100 A washer may be provided within the coupling to separate the, or each grab ring from the, or each washer.

105 The annular insert may be a screw or may be a push-in or snap-in member formed for example of plastics material.

110 The side walls of the sleeve may taper away from the open end thereof or have a step reduction in diameter so as to assist the compression of the "O" ring as the insert member is placed in position.

115 A shoulder may be provided within the sleeve to support axially the interior insert members on their sides remote from the open end of the sleeve. Such shoulder may be provided by the wall of the sleeve or by a further insert member.

120 In an alternative embodiment of the invention, the grab ring may be located on the side of the gasket facing the open end of the sleeve, and in this case the end insert member may be capable of insertion into the open end of the sleeve and be so shaped as to lift the teeth of the grab ring radially outwards so as to disengage them from a coupled pipe to ease its removal.

130 Whilst the invention has been described in the context of the use of a toothed grab ring,

retaining rings of similar effect may be utilised.

The invention includes within its scope a pipe joint incorporating a coupling as herein described.

5 In order that the invention may be more readily understood, three embodiments thereof will now be described by way of example with reference to the accompanying drawings in which:

10 Figure 1 is a sectional side elevation of part of one embodiment of a coupling of the invention;

Figure 2 is a similar section of a second embodiment of the invention; and

15 Figure 3 is a similar section of a third embodiment of the invention.

Referring now to Figure 1 it will be seen that there is shown half of a double ended coupling which has a metal sleeve body 1 typically of copper, having an inturned lip 2 at its lower end 3. This is slotted on one side so as to behave as a screw thread. An end-insert member in the form of a plastic screw in end cap 4 engages with this lip and can be removed to allow full dismantling of the coupling or release of the compressive force acting upon the gasket 5 as hereinafter described.

Within the sleeve 1 are located interior insert members comprising annular "O" ring gasket 5 and a toothed grab ring 6 separated by a washer 7. Grab ring 6 is axially supported by a plastic insert 8 located against a centre stop 9 of the sleeve.

35 A pipe 10, typically of polyethylene or copper, may be inserted into the coupling with the screw-in end cap 4 removed or disengaged from the "O" ring gasket as shown in the lower half of the figure, and this may then be screwed in so as to engage upon the "O" ring gasket 5 which is pushed along an inwardly tapering body section 11 of the sleeve to apply both axial and radial compression upon the "O" ring which is deformed to compress upon the pipe for sealing contact. The washer 7 and end cap 4 may have opposing faces out of plane with respect to a plane at right angles to the axis of the fitting. The effect of this will be to distort the plane of the "O" ring on compression and thereby reduce the circumference of the "O" ring and assist compression. This is illustrated in the top half of the Figure.

The unscrewing of the end cap and the removal of the "O" ring compression forces upon the pipe 10 makes assembly and disassembly easier. This is shown in the lower half of the Figure.

60 Compression of the "O" ring by the screw cap may be carried out by means of hand manipulation, a spanner or similar tool applied to the cap.

The embodiment of Figure 2 is very similar to that of Figure 1. It is to be noted that a metal sleeve body 12 again has an inturned lip

13 at the periphery of the pipe entrance which is used to retain a push-in end cap 14.

70 The end cap 14 is of a spring-like material which when pressed axially, folds into the open end of a sleeve so that the "O" ring 15 is pushed passed a tapered step 16 in the sleeve to apply the desired radial and axial compression thereto and hence the desired sealing compression with inserted pipe 17.

75 The cap is illustrated before and after insertion at the lower and upper part respectively of Figure 2. The end cap can be spring released for disassembly of the coupling.

Referring now to Figure 3, it is to be noted that yet again the metal sleeve 18 has an inturned lip 19 at its open end which is used to retain a sliding end insert member 20.

In the arrangement of Figure 3 "O" ring 21 is located between locating plastic insert 22 and washer 23, and grab ring 24 is adjacent the open end of sleeve 18.

85 The pipe 25 is pushed into the sleeve while pressure is applied via the end insert 20 to the grab ring 24. The grab ring teeth are thereby deflected radially outwardly and do not engage with the pipe until the pipe has been pushed passed the rubber ring and is fully inserted. The end insert is then released enabling the grab ring to engage and grip the pipe. The pipe may be released from the fitting by applying pressure to the end insert to release the grab ring from the pipe to allow it to be withdrawn.

90 The embodiments of the invention particularly described above ensure easing or reduction of the effort necessary for assembly or dismantling required either in making or unmaking a joint with a pipe and also enables the removal of component parts of the coupling that need replacement.

100 The first and second embodiments of Figures 1 and 2 respectively enable the grab ring/washer/sealing gasket or any of these parts to be fitted upon the pipe before insertion into the coupling due to the wide opening of the mouth of the coupling, and at the same time ensure adequate compression of the gasket after insertion of the pipe by its movement within a tapered or stepped section of the fitted body.

115 The embodiment of Figure 3 enables deflection of the grab ring teeth from the pipe for easy assembly and disassembly.

120 CLAIMS

1. A pipe coupling comprising a sleeve having at least one open end for the receipt of a pipe to be coupled; an annular grab ring located within the sleeve, the grab ring being adapted in use to engage the external periphery of a pipe inserted into the sleeve and inhibit removal thereof; an elastomeric annular sealing gasket located within the sleeve member on the side of the grab ring facing the open end; and an annular end insert member

capable of insertion through the open-end of the sleeve so as to provide an axially compressive force upon the annular gasket located therewithin.

- 5 2. A pipe coupling as claimed in claim 1 wherein the grab ring is provided with teeth which in an unstressed condition extend and project radially inwardly within the sleeve member and are inclined axially inwardly of the sleeve member.
- 10 3. A pipe coupling as claimed in claim 1 or 2 wherein the end insert member is removable.
4. A pipe coupling as claimed in claim 1, 2 or 3 of double ended form having a grab ring and sealing gasket at each end.
- 15 5. A pipe coupling as claimed in claim 4 wherein an end stop is located part way along the coupling to locate the ends of pipes inserted therein.
- 20 6. A pipe coupling as claimed in any one of the preceding claims wherein a washer is provided within the coupling to separate the or each grab ring from the or each gasket.
- 25 7. A pipe coupling as claimed in any one of the preceding claims wherein the annular end insert member comprises a screw-in member.
8. A pipe coupling as claimed in any one of claims to 6 wherein the annular end insert member comprises a push-in or snap-in member.
- 30 9. A pipe coupling as claimed in any one of the preceding claims wherein the annular end insert member is formed of plastics material.
- 35 10. A pipe coupling as claimed in any one of the preceding claims wherein the side walls of the sleeve taper inwardly, or have a step diameter reduction, away from the or each open end thereof.
- 40 11. A pipe coupling as claimed in any one of the preceding claims wherein at least one shoulder is provided within the sleeve to support axially the interior insert members on their sides remote from the or each open end of the sleeve.
- 45 12. A pipe coupling as claimed in claim 11 wherein the shoulder is provided by the wall of the sleeve.
13. A pipe coupling as claimed in claim 11 wherein the shoulder is provided by a further insert member.
- 50 14. A pipe coupling substantially as shown in and as hereinbefore described with reference to Figure 1 or Figure 2 of the accompanying drawings.
- 55 15. A pipe coupling comprising a sleeve having at least one open end for the receipt of a pipe to be coupled, annular interior insert members located within the sleeve, said insert members comprising a grab ring adapted in use to engage a pipe inserted into the sleeve to inhibit removal thereof and a sealing gasket; and a removable end insert member capable of location about a pipe when disposed in the coupling, said end insert member
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being capable of axial movement at least partially within the open end of the coupling when located about a pipe whereby to cause radial movement of at least one interior insert member to ease axial movement of the pipe relative to the coupling.

16. A pipe coupling as claimed in claim 15 wherein the grab ring is located on the side of the gasket facing the open end of the sleeve, and the end insert member is adapted and shaped for insertion into the open end of the sleeve into engagement with the grab ring such as to lift at least part of the grab ring radially outwards out of engagement with a pipe inserted in the sleeve.
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17. A pipe coupling as claimed in claim 15 or 16 of double ended form having a grab ring and a sealing gasket at each end.

18. A pipe coupling as claimed in claim 17 wherein an end stop is located part way along the coupling to locate the ends of pipes inserted therein.
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19. A pipe coupling as claimed in any one of claims 15 to 18 wherein a washer is provided within the coupling to separate the or each grab ring from the or each gasket.

20. A pipe coupling as claimed in any one of claims 15 to 19 wherein the end insert member comprises a push-in or snap-on member.
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21. A pipe coupling as shown in and as hereinbefore described with reference to Figure 3 of the accompanying drawings.

22. A pipe joint incorporating a pipe coupling as claimed in any one of the preceding claims.
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